

## WHAT IS CLAIMED IS:

1. A position detection system for use in association with computing applications, the system comprising:

a positional element for attaining a position and comprising a first emitter for emitting a substantially continuous ultrasonic waveform decodable to fix said position, and

a detector arrangement for detecting said waveform in a manner permitting fixing of said position and outputting said waveform for computation, in a manner retentive of said position fixing ability.

2. The position detection system of claim 1, wherein said detector arrangement is operable to emit said waveform decodable to fix said position, such that said waveform is decodable at low sampling rate.

3. The position detection system of claim 1, wherein said waveform comprises a periodicity.

4. The position detection system of claim 2, wherein said outputting comprises providing said waveform decodable at low sampling rate to at least one analog input of a computing device for said computation.

5. The position detection system of claim 4, wherein said outputting comprises providing said waveform to at least two analog inputs of said computing device.

6. The position detection system of claim 1, comprising a plurality of positioning elements, and wherein said detector arrangement is configured to supply respective waveforms as separate channels for said outputting.

7. The position detection system of claim 6, further comprising a plurality of detector arrangements to give greater detection precision.

8. The position detection element of claim 6, wherein said separate channels are time multiplexed or frequency multiplexed.

9. The position detection system of claim 6, wherein each positioning element further comprises a modulator for modulating said continuous wave.

10. The position detector system of claim 9, wherein said modulator is a frequency modulator.

11. The position detector system of claim 10, wherein each positioning element is provided with a frequency hopping sequence to allow simultaneous use of said plurality of positioning elements.

12. The position detector system of claim 11, wherein each said frequency hopping sequence is a different pseudo-random sequence.

13. The position detection system of claim 9, wherein said modulator is an amplitude modulator.

14. The position detection system of claim 9, wherein said modulator is operable to modulate data additional to positional data to said waveform.

15. The position detection system of claim 6, wherein each positioning element comprises a unique identifier.

16. The position detection system of claim 1, wherein said continuous wave is modulated.

17. The position detection system of claim 16, wherein said continuous wave is modulated using spread spectrum.

18. The position detection system of claim 16, wherein said continuous wave is modulated using time division modulation.

19. The position detection system of claim 1, wherein said positional element comprises a biometric sensor.

20. The position detection system of claim 1, wherein the detection arrangement comprises a plurality of receivers, to provide multi-dimensional detection of said position.

21. The position detection system of claim 20, wherein said outputting comprises providing said waveform decodable at low sampling rate to an analog input of a computing device for said computation and further being operable to multiplex signals of said waveform from each one of said plurality of receivers for said inputting to said analog input.

22. The position detection system of claim 21, operable to make use of a demultiplexing capability of said computing device to demultiplex said signals received at said analog input.

23. The position detection system of claim 1, wherein said positional element further comprises a second emitter for emitting a signal additional to said continuous waveform and having a different speed therefrom, therewith to obtain data indicative of a distance between said positional element and detectors of said detector arrangement from a time delay between said continuous waveform and said additional signal.

24. The position detection system of claim 23, wherein said additional signal is a light speed signal.

25. The position detection system of claim 24, wherein the light speed signal is an infra-red signal.

26. The position detection system of claim 1, wherein said outputting comprises providing said waveform to an analog input of a computing device.

27. The position detection system of claim 26, wherein said analog input is an input to an analog to digital converter.

28. The position detection system of claim 27, wherein said analog to digital converter is part of a sound card.

29. The position detection system of claim 27, wherein said analog input is at least one of a microphone input, a line-in input, and a modem input.

30. The position detection system of claim 29, wherein said detector arrangement is configured to be powered from said computing device via said analog input.

31. The position detection system of claim 1, wherein said manner retentive of said position fixing ability comprises retaining said ability over low frequency sampling.

32. The position detection system of claim 31, wherein said low frequency sampling comprises a rate compatible with Nyquist rate sampling of sound signals.

33. The position detection system of claim 32, wherein said rate is below 50KHz.

34. The position detection system of claim 32, wherein said rate is substantially 44KHz.

35. The position detection system of claim 32, wherein said rate is substantially 6KHz.

36. The position detection system of claim 1, wherein the system further comprises a decoding unit for carrying out said computation to decode said waveform and indicate said position.

37. The position detection system of claim 36, wherein said decoding unit comprises a maximum likelihood detector for carrying out said decoding by finding a most likely distance.

38. The position detection system of claim 37, wherein said maximum likelihood detector comprises a channel model for modeling passage of said waveform from said positional element to said waveform decoding unit, thereby to provide a reference signal against which to identify said most likely distance.

39. The position detection system of claim 37, wherein said maximum likelihood detector is followed by a correlator for confirming said most likely distance.

40. The position detection system of claim 1, further comprising a synchronizer for synchronizing between said detector arrangement and said positional element.

41. The position detection system of claim 40, wherein said synchronizer is operable to use at least one of IR and RF signaling to carry out said synchronizing.

42. The position detection system of claim 40, wherein said synchronizer is operable to monitor synchronization deviations thereby to reduce a frequency with which repeat synchronizations are carried out.

43. The position detection system of claim 40, wherein said synchronizing is with a local oscillator at said positional element.

44. The position detector system of claim 40, wherein said synchronizer is further operable to add a synchronization signal to said waveform, therewith to synchronize with a host device.

45. The position detection system of claim 1, wherein said positional element is wired to said detector array.

46. The position detection system of claim 1, wherein said positional element comprises a digital encoder for encoding digital data into said continuous waveform.

47. The position detection system of claim 36, wherein said waveform decoding unit is provided as a client program for installation in a computing device.

48. The position detection system of claim 36, wherein said waveform decoding unit is provided as a client program for installation in an operating system of a computing device.

49. The position detection system of claim 36, wherein said waveform decoding unit is integrated with said detector arrangement.

50. The position detection system of claim 1, wherein said positional element further comprises a pressure sensor to provide data of pressure being exerted on said positional element.

51. The position detection system of claim 1, wherein said positional element further comprises attitude detection to provide data of an attitude at which said positional element is being held.

52. The position detection system of claim 1, wherein said positional element further comprises:

a pressure sensor to provide data of pressure being exerted on said positional element, and

attitude detection to provide data of an attitude at which said positional element is being held.

53. The position detection system of claim 52, wherein said attitude detection comprises two waveform transmitters placed a predetermined distance apart on said positional element, each one for separate positional detection.

54. The position detection system of claim 52, being usable to extract from a user of said positional element, a triplet of movement, pressure and attitude vectors.

55. The position detection system of claim 1, further comprising electronic signature functionality provided in said positional element.

56. The position detection system of claim 55, further comprising biometric signature functionality provided in said positional element.

57. The position detection system of claim 1, wherein said positional element further comprises a receiver for receiving control data.

58. The position detection system of claim 1, further being operable to relay data of said position to other elements.

59. The position detection system of claim 1, wherein said detector array is associated with a cellular telephony device, thereby to provide writing input capability for said telephony device.

60. The position detection system of claim 59, further comprising an application for using said writing input as a dialing input for said telephony device.

61. The position detection system of claim 1, further comprising:  
a location calculation application, and  
a handwriting to text conversion application,  
to provide a handwriting to digital interface.

62. The position detection system of claim 61, further comprising at least one of a text to speech conversion application and a language translation application, thereby to provide reading or translation from said handwriting input.

63. The position detection system of claim 54, further comprising electronic signature functionality provided in said positional element, and verifying functionality for verifying extracted triplets of user signatures, the system being operable to enable said electronic signature functionality with verification by said verification functionality of a user signature.

64. The position detection system of claim 1, wherein said positional element is a personal locator for attachment to a person.

65. The position detection system of claim 1, wherein said positional element is an item locator for indication of location of an item within a space.

66. The position detection system of claim 64, wherein there is further provided an application for calculating said location and issuing control signals in response to said location.

67. The position detection system of claim 65, wherein there is further provided an application for calculating said location and issuing control signals in response to said location.

68. The position detection system of claim 66, wherein said control signals are at least one of signals to direct the focus of a stereo sound system, signals to direct a camera, signals to direct an incoming communication and signals to direct a robot.

69. The position detection system of claim 67, wherein said control signals are signals to direct a camera, signals to direct a robot, signals to direct machinery, signals to direct a predetermined sequence, signals to direct an assembly sequence and signals to direct a repair sequence.



70. The position detection system of claim 1, comprising a plurality of units, each unit comprising one of said positional elements and one of said detector arrays, wherein each unit is operable to locate all adjacent units, thereby to provide chaining of said units.

71. The position detection system of claim 70, wherein each unit comprises a unique identifier.

72. The position detection system of claim 64, wherein said positional element is part of a virtual reality game accessory.

73. A position detection method for use in association with a computing device having an analog input, the method comprising:

using a positional element to attain a position,

emitting a substantially continuous ultrasonic waveform decodable to fix said position, and

detecting said waveform in a manner permitting fixing of said position and outputting said waveform in a manner retentive of said position fixing ability, thereby to provide said computing device with an indication of said position.

74. The position detection method of claim 73, wherein said outputting comprises outputting said waveform as an analog signal.

75. The position detection method of claim 74, further comprising decoding of said waveform at said computing device to extract data of said position.

76. A position detection system of a computing device, the system comprising:

a positional element for attaining a position and comprising an ultrasonic continuous waveform emitter for emitting an ultrasonic continuous waveform decodable to fix said position,

a detector arrangement for detecting said waveform in a manner permitting fixing of said position, and

a signal decoder for receiving said waveform from said arrangement and decoding said attained position from said waveform.

77. The position detection system of claim 76, wherein said detector arrangement and said signal decoder are connected via an analog link.

78. The position detection system of claim 76, wherein said positional element is operable to emit said waveform decodable to fix said position, such that said waveform is decodable at low sampling rate.

79. The position detection system of claim 76, wherein said waveform is a substantially continuous waveform.

80. The position detection system of claim 76, wherein said detection arrangement comprises a plurality of signal detectors arranged at different locations each separately to detect said waveform, thereby to provide said position fixing as differential information between said detected signals.

81. The position detection system of claim 80, wherein said signal decoder comprises at least one reference signal constructed using a model of said system and a maximum likelihood detector for determining a most likely position based on said reference signal.

82. The position detection system of claim 81, wherein said decoder further comprises a correlator for using a correlation function to confirm said most likely position.

83. The position detection system of claim 76, wherein said positional element is operable to emit a combination of signals having different speeds to allow a receiver to calculate a distance thereto from a time delay therebetween.

84. The position detection system of claim 83, wherein said combination comprises a light speed signal and a sound speed signal.

85. The position detection system of claim 84, wherein the light speed signal is an infra-red signal.

86. The position detection system of claim 84, wherein the sound speed signal is an ultrasonic signal.

87. The position detection system of claim 76, wherein said manner retentive of said position fixing ability comprises retaining said ability over low frequency sampling.

88. The position detection system of claim 87, wherein said low frequency sampling comprises a rate compatible with Nyquist rate sampling of sound signals.

89. The position detection system of claim 88, wherein said rate is below 50KHz.

90. The position detection system of claim 88, wherein said rate is substantially 44KHz.

91. The position detection system of claim 88, wherein said rate is substantially 6KHz.

92. The position detection system of claim 76, wherein said positional element further comprises a pressure sensor to provide data of pressure being exerted on said positional element.

93. The position detection system of claim 76, wherein said positional element further comprises attitude detection to provide data of an attitude at which said positional element is being held.

94. The position detection system of claim 76, wherein said positional element further comprises:

a pressure sensor to provide data of pressure being exerted on said positional element, and

attitude detection to provide data of an attitude at which said positional element is being held.

95. The position detection system of claim 94, being usable to extract from a user of said positional element, a triplet of movement, pressure and attitude vectors.

96. The position detection system of claim 76, further comprising electronic signature functionality provided in said positional element.

97. The position detection system of claim 95, further comprising electronic signature functionality provided in said positional element, and verifying functionality for verifying extracted triplets of user signatures, the system being operable to enable said electronic signature functionality with verification by said verification functionality of a user signature.

98. A position detection system for use in association with computing applications, the system comprising:

a positional element for attaining a position and comprising a first emitter and a second emitter each for emitting a waveform decodable to fix said position the emitters being a predetermined distance apart, and

a detector arrangement for detecting said waveforms in a manner permitting fixing of said position and permitting determination of an attitude of said positional element, the detector arrangement further being operable to output said waveforms for computation, in a manner retentive of said position fixing ability.

99. The position detection system of claim 98, wherein said positional element further comprises a pressure sensor to provide data of pressure being exerted on said positional element.

100. The position detection system of claim 98, wherein said waveform is one of an IR waveform, an RF waveform, an acoustic waveform and a continuous acoustic waveform.

5 101. The position detection system of claim 98, wherein said outputting is in a manner suitable for supplying to an analog input of a computing device.

102. The position detection system of claim 98, wherein said detector arrangement is an arrangement of orthogonal loops.